ND: 84173095
AU: Steinhagen WH; Barrow CS
TI: Sensory irritation structure-activity tudy of inhaled aldehydes in B 3F1 and Swiss-Webster mice.
SO: Toxicol Appl Pharmacol, 72 (3) 495-503 /1984 Mar 15/IMD=8407
LA: English
CY: United States
JC: VWO SS: 0041-008X
CS: Chemical Industry Institute of Toxicology, Research Triangle Park, North Carolina.

→ DRRS
B6C3F1
Allergy assay (pat./Inf)

CT: ALDEHYDES/*toxicity IRRITANTS/* RESPIRATION/*drug effects ANIMAL ATMOSPHERE EXPOSURE CHAMBERS COMPARATIVE STUDY MALE MICE PLETHYSMOGRAPHY, WHOLE BODY SPECIES SPECIFICITY STRUCTURE-ACTIVITY RELATIONSHIP MAXIMUM PERMISSIBLE EXPOSURE LEVEL
SU:
AB: The sensory irritation potential of a series of saturated and unsaturated aliphatic and cyclic aldehydes was investigated in B6C3F1 and Swiss-Webster mice. With the reflex decrease in respiratory rate as the endpoint response, alpha, beta-unsaturated aliphatic aldehydes yielded RD50 values (concentration which elicits a 50% decrease in respiratory rate) ranging from 1 to 5 ppm while saturated aliphatic aldehydes with two or more carbons produced RD50 values from 750 to 4200 ppm. Cyclic aldehydes produced intermediate RD50 values which ranged from 60 to 400 ppm. No statistically significant differences were found between concentration-response curves of B6C3F1 and Swiss-Webster mice. Saturated aliphatic aldehydes with two or more carbons were nearly 1000 times less potent than formaldehyde. Although the mechanisms responsible for stimulation of trigeminal nerve endings by airborne chemicals are poorly understood, several hypotheses may help to explain the differences seen in this study. For example, the sensory irritation potency of the saturated aliphatic aldehydes diminished with their reported dehydration constants which may determine the degree to which these aldehydes crosslink with receptor proteins. The sensory irritation potency of acrolein and crotonaldehyde was probably due to 1,2 or 1,4 addition reactions. Additionally, molecular conformation and a recently published physical mechanism may contribute to sensory irritation responses, particularly for the less reactive aldehydes. Tentative threshold limit values (TLVs), based upon prevention of sensory irritation, were extrapolated from the RD50 values of Swiss-Webster mice. With the exception of crotonaldehyde, good agreement was found with currently published TLVs.

FUS62

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